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Post-harvest Decay Control of Peaches in 1952

By

W. L. Smith, Jr., Associate Pathologist and
M. H. Haller, Horticulturist

Division of Handling, Transportation and Storage
of Horticultural Crops

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Introduction

Previous years results have shown that post harvest fungicidal treatments effectively reduce the decay of peaches due to Monilinia fructicola (Wint) Honey (brown rot) that develops during shipping and marketing. Results with Rhizopus nigricans Fr. have been inconsistent. Brown rot was reduced with certain liquid or dust fungicides, but not with any of the fumigants tested (1 & 2). Vandemark and Sharvelle (3) have reported perfect control of decay in peaches inoculated with a mixed spore suspension of Monilinia and Rhizopus by fumigating the fruit with certain volatile chemicals. Studies during the summer of 1952 were concerned with a thorough testing of those volatile chemicals and a continuation of the studies with liquid and dust fungicides.

Materials and Methods

Peaches for these tests were obtained at the wholesale market in Washington, D. C., usually within 24 hours after they had been picked, and were representative in maturity of peaches usually shipped commercially. Each of the tests, unless otherwise indicated, was repeated 4 times during the course of the summer, and, therefore, each material was tested on several varieties of peaches from different growing areas. Before the start of an experiment the peaches were sorted into lots of approximately 50 hard to firm peaches. One lot for each treatment remained uninoculated, a second was inoculated with spores of Monilinia and the third with spores of Rhizopus. The inoculum used was a suspension of spores of either Monilinia or Rhizopus in beef-peptone broth (Beef extract 0.3 percent, bacto peptone 0.5 percent) to which 0.1 percent of a wetting agent (Tween 20) was added. Spores for the inoculum were obtained from decayed peaches sporulating with the respective organism. The concentration of spores in the respective suspensions was 30 to 40 brown rot spores or 70 to 80 rhizopus spores in the low power field of the microscope. Previous results (2) have shown that some type of injury to the fruit is necessary for consistent infection with Rhizopus. In these tests each of the peaches to be inoculated with this organism was cut with a knife on each cheek, the resultant injury resembling a finger nail cut. The fruit inoculated with Monilinia spores and the uninoculated checks were not injured. The fruit was inoculated with brown rot by spraying with the suspension of Monilinia spores while the fruit was turning slowly on a roller table. No count was made on the number of spores applied per fruit, but as each fruit was sprayed an equal amount of time with the spore suspension each fruit probably received about an equal number of spores. The spore load was roughly estimated to be around 1,000 per peach. Peaches were inoculated with Rhizopus by dipping the cut surface in the spore suspension.

The method of applying the liquid and dust fungicides was identical to that previously reported (2). Fumigation treatments were conducted in water sealed 10 cubic foot metal chambers each of which contained an electric hot plate to vaporize the material and a samll fan to circulate the gas. The test material was vaporized on the hot plate turned to low heat for 5 minutes and then the gas was circulated with the fan for 5 minutes. This was usually repeated to assure complete vaporization of the test material. The concentration

of the various fumigants, figured on the basis of empty chambers, and length of exposure are given in tables 2, 3, 4, 5. Fruit was fumigated immediately after inoculation or after 12, 24, or 36 hours. At the end of the fumigation period readings were taken on the amount of CO_2 accumulated in each of the chambers. The concentrations varied from 3 to 4 percent after 12 hours to 6 to 8 percent after 24 hours. This would not be high enough to affect the ripening of the fruit or development of the organisms.

The source of the various lots of fruit used in these tests is shown in table 1 together with the decay from natural infection that developed during ripening (6 days at 75° F.) and the increases in decay obtained by artificial inoculation. The first 12 lots were used for preliminary tests to determine safe concentrations of the fungicides and for tests of inoculation techniques. Complete records of decay were not obtained with these lots. Only 4 of the last 12 lots (used in fungicidal tests) developed over 10 percent brown rot from natural infection (column B). Only 4 of these 12 lots when wrapped developed over 10 percent rhizopus rot (column B). However, the lots with over 10 percent rhizopus were not the same as those with over 10 percent brown rot so that 8 of these 12 lots had over 10 percent total decay.

Each fruit was wrapped separately in copper impregnated paper to prevent the spread and nesting of rhizopus rot as was mentioned in an earlier report (2). This is not a commercial practice and a truer picture of the amount of decay that would develop under commercial conditions would be representated by unwrapped lots. Only in the last 6 lots were unwrapped samples held (Table 1). All fruit was placed in half-bushel baskets at a constant temperature of 75° F., and readings on the amount and type of decay were taken 3 and 6 days after inoculation. The percentage of decayed fruit given in the tables represents the cumulative decay that occurred during the 6 day holding period, and, with the exception of table 1, represents only inoculated fruit.

Sulfur dust was used as the standard treatment and any material not giving better control than this is not considered commercially important. It is considered that the material must also give at least 50 percent decay reduction as compared with the check.

Results and discussion

Inoculation increased the percentage of brown rot infected peaches from an average of 15.4 to 70.3 and the rhizopus infected peaches from an average of 9.5 to 73.5.

Decay Control

Copper impregnated wraps - As was mentioned earlier a comparison of wrapped and non-wrapped peaches was made only with non-inoculated fruit. With the unwrapped samples brown rot averaged 20 and rhizopus rot 35 percent a further indication that contrary to general belief, losses due to rhizopus rot are more serious than those due to brown rot during marketing and ripening of the fruit. Wrapping the peaches in copper impregnated wraps reduced brown rot from about 20 percent to slightly less than 15 percent, a reduction of only 27.5 percent. With rhizopus

on the other hand a reduction of 34.5 to only 6.2 percent or a reduction of 81.7 percent was obtained by wrapping the fruit. This much reduction in rhizopus rot would seem to justify the additional expense of individually wrapping the fruit in treated wraps.

Trichloroethylene. Vanedmark and Sharvelle (3) used trichloroethylene as a fumigant. They reported complete control of brown rot and rhizopus rot with a 24 hour fumigation at a concentration of 1:10,000 (1 volume of liquid to 10,000 volumes of air) 24 hours after inoculation, and no injury to the fruit even at concentrations as high as 1:4,000. In preliminary tests at Beltsville this material caused very severe browning of the skin and flesh of peaches at 1:5,000, but seemed safe at 1:10,000. It was therefore used in the fungicidal tests at 1:10,000 and 1:20,000, but in 2 of these tests it caused rather severe injury at 1:10,000. As shown in table 2 there was practically no reduction of brown rot regardless of concentration or time of exposure. Sulfur dust on the other hand gave a 53.0 percent reduction of brown rot. The material did reduce rhizopus rot by 57.5 percent when used for 24 hours at 1:20,000 immediately after inoculation. It caused no injury to the fruit and was as effective at this concentration as at the higher concentration of 1:10,000 at which some injury occurred. The fumigation treatment was more effective in reducing rhizopus rot when applied immediately after inoculation than when delayed until 12, 24, or 36 hours after inoculation.

A taste panel detected slight off flavor in fruit fumigated with 1:10,000 trichloroethylene for 24 hours when tasted immediately after the fruit was removed from the fumigation chamber. There was some indication that the off flavor was retained as long as 2 days. No off flavors were noted when this concentration was used for a shorter period (12 hours) or when a lower concentration (1:20,000) was used for 24 hours.

Tetrachloroethylene. Vandemark and Sharvelle (3) reported tetrachloroethylene at concentrations of 1:4,000 and 1:10,000 gave complete inhibition of decay but they indicated that slight injury occurred at both concentrations. In preliminary tests for injury, severe darkening of the skin and flesh and softening of the fruit occurred when a concentration of 1:10,000 of this material was used. Consequently in the disease control tests concentrations of 1:20,000 and 1:40,000 were used. Fumigation with tetrachloroethylene at 1:40,000 for 24 hours immediately after inoculation reduced rhizopus rot by 65.5 percent of that on the checks (table 3) and at 1:20,000 for 24 hours it reduced this rot 71 and 44 percent (tables 3 & 4). Less reduction in rhizopus infection was obtained when fumigation was delayed 24 hours or the fumigation time was reduced. At both concentrations only slight reductions of brown rot were obtained while sulfur dust reduced brown rot by 66.7 and 49.1 percent. Slight browning of the skin occurred in some instances at both concentrations.

A distinct off flavor was detected in the peaches treated with a concentration of 1:20,000 for 24 hours at the time they were removed from the fumigation chamber. This off flavor disappeared after airing for 1 day and no off flavor was detected when a lower concentration or shorter exposure was used.

1,1,2 trichloroethane - Vandemark and Sharvelle (3) reported that 1,1,2 trichloroethane at concentrations of 1:4,000 and 1:10,000 gave complete inhibition of the decay pathogens, but that slight injury to the fruit occurred. In tests for injury at Beltsville two varieties of peaches were severely injured at a concentration of 1:10,000, but not at 1:20,000. At the latter concentration rhizopus infection was reduced by 47 percent of the check when treated immediately after inoculation (table 4). Practically no reduction was obtained when the treatment was delayed 24 hours. This material also reduced brown rot by 30 percent of the control when fumigated immediately. This was less control than was obtained with sulfur dust.

Off flavor of the peaches was detected by a majority of a taste panel when 1,1,2 trichloroethane was used at 1:20,000 for 24 hours and the off flavor was still detectable up to 2 days after the fruit was removed from the fumigation chamber.

Secondary tetrachloroethane - Vandemark and Sharvelle (3) reported this material completely inhibited all rot development at concentrations of 1:4,000 and 1:10,000, but browning of the fruit occurred. Preliminary studies on phytoxicity with S. tetrachloroethane showed injury to the fruit at concentrations as low as 1:60,000. Injury consisted of browning of the skin, the discoloration often appearing as darkened streaks. In the tests for disease control a concentration of 1:100,000 was used. The fruit was not injured at this concentration, but decay due to either Rhizopus or Monilinia was not reduced appreciably (table 4).

Even at the low concentration of 1:100,000 for 24 hours a decided off flavor in the peaches was detected by all tasters. The off flavor was retained as much as 5 days after the fruit was removed from the chambers. The panel scores showed that the off flavor was bad enough to make the peaches inedible.

Dowicide A. (Sodium orthophenylphenate). Data in table 4 show that Dowicide A as a 0.5 percent spray gave appreciable reduction of both brown rot and rhizopus decay. In this respect it was unique in that it was the only material used in 4 replicate tests that gave reasonably effective protection against both organisms. The decay reduction of 53.5 percent in the case of brown rot was slightly better than the sulfur dust treatment which gave 49.1 percent reduction of this disease. In addition, a reduction of 74.0 percent of the rhizopus infection was obtained. Slight to moderate injury was obtained on some of the peaches in 2 of the 4 replicates, although the concentration utilized had been considered safe in previous tests.

Orthocide 406 (N - trichloromethyl thio-tetra hydrophthalimide) Orthocide 406 has been tested for several years and has consistantly reduced infection of peaches by the brown rot organism. The 1952 results (table 4) show a reduction in brown rot of 61.1 percent which is somewhat better than the 49.1 percent reduction obtained with sulfur dust. It also reduced rhizopus infection on peaches by 20.9 percent, but such a reduction is not large enough to be of commercial importance. This material produced slight injury on some of the fruit in all of the tests, though this concentration did not injure the fruit in previous years.

Isothan Q 15 (Lauryl isoquinolinum bromide) - Isothan Q 15 as a 0.5 percent spray gave a 74.2 percent reduction of Monilinia infection compared with 62.7 percent reduction with sulfur dust in 6 replications (combined results in tables 3 and 5). The compound was completely ineffective against Rhizopus infection, and was even accompanied by a considerable increase in the amount of infection (table 3). This material caused slight injury to the fruit of two of the 4 varieties.

Isothan Q 15 in wax emulsion. Isothan Q 15 was added to 2 parts of warm water and then 1 part of wax emulsion (Stafresh) was added, the resultant concentration of Isothan in the emulsion being 0.5 percent. When sprayed on peaches a 71.1 percent reduction in brown rot infection was obtained while sulfur dust gave only a 55.4 percent reduction of this organism (table 5). However, there was a slight increase in the amount of rhizopus rot as compared with the check (table 5). Though injury did occur when Isothan was used alone no injury of the fruit was noticed when it was incorporated in the wax emulsion in any one of the 4 replicates, nor did the wax noticably affect ripening of the fruit.

Shell XP 63 (2 heptadecyl 4,4,6 tri methyl tetra hydroprimidine) Tested for the first time in 1952 at a concentration of 150 parts per million this material reduced brown rot infection by 64.2 percent which was about equal to the reduction obtained with sulfur dust (table 3). There was, however, a slight increase in the amount of rhizopus infection as compared with the check. Though medium to severe fruit injury occurred at concentrations of 10,000, 5,000 and 2,500 parts per million at 150 parts per million only very slight injury was recorded on a few of the fruit in one replicate.

N521. (3,5-dimethyl-tetrahydro - 1,3,5 2H-thiadiazine - 2 thione) The crystal form of this compound was difficult to get into solution until the water was heated almost to a boiling temperature. Some of the effectiveness of the compound may have been lost or the concentration slightly reduced due to vaporization when heated. A spray containing 0.25 percent gave a 63.0 percent reduction of brown rot, but was ineffective against rhizopus rot (table 3). Slight injury was noted in a few peaches in 2 of the 4 replicates.

Imidazoline (2 tridecyl - 2 - imidazoline) - Imidazoline was not soluble in any medium tested that would not cause injury to peaches. A 0.1 percent spray suspension of the material was prepared when the appropriate amount of the material was added to 5 percent carbowax 1500, and then this suspension added to the required amount of hot water. It gave a 62.1 percent reduction of brown rot infection as compared with 55.4 percent with sulfur dust, but an increase of 29.3 percent of rhizopus rot developed (table 5). No injury to the fruit was noted in any of the replicates.

Rimocidin. This antibiotic was tested in the first 2 replicates at a concentration of 20 ppm. At this concentration it was ineffective against both organisms and the concentration was increased to 100 ppm. in the last two replications. At the higher concentration it reduced both brown rot and rhizopus rot (table 4). Because it was effective against both organisms, further tests with this material are desirable, although slight injury was noted.

Other materials that were tried but failed to show sufficient promise to justify further testing were:

Thiolutin, which is another antibiotic, was used at 20 and 100 ppm. (table 4) but failed to reduce either brown rot or rhizopus rot.

Sodium propionate has been used in bread to control rhizopus rot but when used on peaches as a 2 percent spray it appeared to increase rhizopus rot and was ineffective against brown rot (table 3).

2 chloro - 3,5 dimethyl phenoxy ethanol (2121) used as a spray at a concentration of 1000 ppm. in 5 percent carbowax was ineffective against both brown rot and rhizopus rot (table 4).

3,5 dimethyl - 4 - nitrosopyrazole used as a 0.1 percent suspension in only 2 replications reduced brown rot somewhat but was less effective than sulfur dust.

A wax emulsion (Stafresh) used alone as a spray (diluted 1 part of concentrated emulsion to 2 parts water) reduced brown rot 33 percent but appeared to increase rhizopus rot slightly.

Lime sulfur impregnated wraps were made by dipping plain wraps in liquid lime sulfur (2 qts. to 100 gal.). When dry they were used to individually wrap the peaches. The wraps reduced brown rot only 30 percent and there was a slight increase in rhizopus rot (table 5).

Many of the chemicals appear to have increased decay due to Rhizopus. These apparent increases were not necessarily due to the materials themselves, but may have been due to the spores being washed into the cuts by the spraying operation.

Summary

The group of fumigants reported on by Vandemark and Sharvelle (3) were tested in 1952. These tests showed that the concentrations used by the above authors caused injury so that greater dilutions were necessary. At these lower concentrations all of the fumigants were ineffective against the brown rot organism but two of them (trichloroethylene and tetrachloroethylene) did appreciably reduce decay due to Rhizopus. All of the fumigants caused at least slight off flavor to the fruit and the off flavor with 1,1,2 trichloroethane and S. tetrachloroethane was strong enough to make the fruit unacceptable.

Of the materials tested as sprays or dusts only Dowicide A and Rimocidin effectively reduced both brown rot and rhizopus rot. Orthocide 406, Isothan Q 15, Shell XP 63, N521, and Imidazoline were effective against the brown rot organism only.

Wrapping peaches in copper-impregnated wraps by preventing the spread of rhizopus greatly reduced decay due to this organism.

References

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Table 1. Source of peaches used in fungicide tests and decay occurring on untreated samples.

Variety	Source	Date	Expt.	Brown rot			Rhizopus rot			Brown rot plus Rhizopus
				A	B	C	A	B	C	B
Erly Red Fre	Fort Valley, Ga.	6/17	1,2	--	0	--	--	0	--	0
Pearson Hiley	" " "	"	1,2	--	0	--	--	0	--	0
Hiley	? Ga.	6/23	3,4	--	0	--	--	0	--	0
G. Jubilee	? "	"	3,4	--	0	--	--	0	--	0
E. Rose	Eagle Spring, N.C.	6/30	5,6	--	0	--	--	7.5	--	7.5
Erly Red Fre	? Va.	"	5,6	--	3.3	--	--	3.3	--	6.6
Hiley	Candor N.C.	7/7	7,	--	34.0	--	--	41.0	51.0	75.0
G. Jubilee	" "	"	7,	--	2.6	--	--	24.5	51.0	27.1
Hiley	" "	7/8	8	--	46.0	--	--	7.7	--	53.7
G. Jubilee	" "	"	8	--	0	--	--	14.3	--	14.3
Erly Red Fre	Round Hill, Va.	7/14	9	--	1.2	--	--	3.6	84.2	4.8
Halehaven X	" " "	"	9	--	1.4	--	--	15.5	84.7	16.9
Red Bird	Magnolia, Del.	7/15	10A	--	86.0	90.0	--	4.0	100.0	90.0
G. Jubilee	Lottsburg, Va.	7/17	10B	--	6.0	48.0	--	44.0	88.0	50.0
Ga. Belle	Candor, N.C.	7/22	11A	--	2.0	70.0	--	2.0	76.0	4.0
Halehaven X	Round Hill Va.	7/24	12A	--	2.5	42.5	--	22.5	80.0	25.0
Ga. Belle	Candor, N.C.	7/29	10C	--	2.2	61.0	--	2.2	73.3	4.4
G. Jubilee	St. Thomas, Pa.	7/31	12B	--	0	72.0	--	2.2	50.0	2.2
Elberta	Candor, N.C.	8/5	11B	25.0	15.0	70.0	2.5	0	85.0	15.0
Halehaven	Richwood N.J.	8/12	10D	2.0	2.0	62.0	50.0	2.0	48.0	4.0
Sun High	Stewartstown Pa.	8/14	12C	42.0	23.8	75.0	38.0	1.0	41.0	24.8
Sun High	Richwood N.J.	8/19	11C	0	8.0	96.0	98.0	30.0	95.7	38.0
Elberta ?	Round Hill Va.	8/21	12D	10.0	8.3	60.7	16.0	4.1	94.0	12.4
Elberta	St. Thomas Pa.	8/26	11D	40.5	29.5	96.0	2.5	0	51.1	29.5
Av. (6 lots)				19.9	14.4		34.5	6.2		20.6
Av. (12 lots)					15.4	70.3		9.5	73.5	24.9

A = Not inoculated - Not wrapped
B = " " - Wrapped
C = Inoculated - Wrapped

Table 2. Effect of post-harvest fungicides on development of decay of peaches inoculated with spores of Monilinia fructicola or Rhizopus nigricans after 6 days at 75° F.

Fungicidal treatment			Percentage infection with M. fructicola						Percentage infection with R. nigricans					
Material	Conc.	Method	A %	B %	C %	D %	Av. %	Red. %*	A %	B %	C %	D %	Av. %	Red. %*
None	--	--	72.0	66.7	65.3	85.6	72.4	--	31.0	83.0	93.2	58.1	66.3	--
Trichloroethylene	1:10,000	Fumigant 24 hr. Immed.	56.0	62.2	88.0	96.0	75.6	-4.4	36.7	13.3	82.0	24.0	39.0	+41.2
"	1:20,000	Fumigant 24 hr. Immed.	70.0	86.7	74.0	95.9	81.7	-12.9	18.0	8.9	56.0	30.0	28.2	+57.5
"	1:10,000	Fumigant 12 hr. Immed	50.0	66.7	66.0	98.0	70.2	+ 3.0	30.0	11.1	62.0	14.0	29.3	+55.8
"	1:10,000	Fumigant 12 hrs. 12 hr. delay	69.4	60.0	92.0	94.0	78.9	- 9.0	2.0	37.5	80.0	44.4	41.0	+38.2
"	1:10,000	Fumigant 24 hrs. 24 hr. delay	69.8	65.0	80.0	92.0	76.9	- 5.9	12.0	72.5	90.0	48.9	55.9	+15.7
"	1:10,000	Fumigant 12 hrs. 24 hr. delay	46.0	52.5	65.3	80.0	61.0	+15.8	26.0	70.0	83.7	77.8	64.4	+ 2.9
"	1:10,000	Fumigant 12 hrs. 36 hr. delay	26.5	87.5	48.0	78.0	60.0	+17.1	20.0	57.5	71.4	80.0	57.2	+13.7
"	1:20,000	Fumigant 24 hrs. 24 hr. delay	50.0	77.5	64.0	88.0	69.9	+ 3.5	6.0	50.0	80.0	48.9	46.2	+30.1
Sulfur	94%	dust	24.0	45.0	31.1	36.0	34.0	+53.0	36.0	88.1	100.0	77.3	75.4	-13.7

* Percentage reduction over check. Plus sign indicates a reduction, minus sign an increase.

Table 3. Effect of post-harvest fungicides on development of decay of peaches inoculated with spores of Monilinia fructicola or Rhizopus nigricans after 6 days at 75° F. Experiment 12.

Fungicidal treatment			Percentage infection with M. fructicola						Percentage infection with R. nigricans					
Material	Conc.	Method	A %	B %	C %	D %	Av. %	Red. %*	A %	B %	C %	D %	Av. %	Red. %*
None	--	--	51.3	75.0	77.0	62.4	66.4	--	67.0	22.5	34.0	91.0	53.6	--
Tetrachloroethylene	1:20,000	Fumigant 24 hr. Immed.	70.0	44.0	74.0	86.0	68.5	- 3.2	26.0	17.5	24.0	48.0	29.9	+44.2
Tetrachloroethylene	1:20,000	Fumigant 12 hr. Immed.	66.0	4.0	76.0	66.0	53.0	+20.2	34.0	24.0	26.0	84.0	42.0	+21.6
Tetrachloroethylene	1:40,000	Fumigant 24 hr. Immed.	64.0	60.0	82.0	80.0	71.5	- 7.7	23.5	12.5	6.0	32.0	18.5	+65.5
Sulfur	94%	dust	20.0	6.1	35.6	26.7	22.1	+66.7	87.5	82.0	20.0	86.0	55.4	- 3.4
Isothan Q 15	0.5%	Spray	17.5	6.0	20.0	38.0	20.4	+69.3	95.0	52.5	82.0	96.0	81.4	-51.9
Sodium propionate	2.0%	Spray	37.5	72.0	64.0	58.0	57.9	+12.8	100.0	82.5	60.0	100.0	85.6	-59.7
Shell XP 63	150 ppm	Spray	12.5	7.9	38.8	36.0	23.8	+64.2	97.5	20.0	34.0	100.0	62.9	-17.4
N 521	0.25%	Spray	12.5	16.0	12.0	58.0	24.6	+63.0	87.5	42.5	16.0	62.5	52.1	+ 2.8

* Percentage reduction over check. Plus sign indicates reduction, minus sign increase.

Table 4. Effect of post-harvest fungicides on development of decay of peaches inoculated with spores of Monilinia fructicola or Rhizopus nigricans after 6 days at 75° F.
Experiment 10

Fungicidal treatment			Percentage infection with M. fructicola						Percentage infection with R. nigricans					
Material	Conc.	Method	A %	B %	C %	D %	Av. %	Red. %*	A %	B %	C %	D %	Av. %	Red. %*
None	--	--	90.2	42.2	65.7	54.7	63.2	--	98.7	94.9	52.9	65.3	78.0	--
S. Tetrachloroethane	1:100,000	Fumigant 24 hr. Immed.	--	34.0	66.7	72.0	57.6	- 6.3	--	72.0	31.1	70.0	57.7	+18.7
S. Tetrachloroethane	1:100,000	Fumigant 24 hr. 24 hr. delay	--	--	62.2	46.0	54.1	+10.1	--	--	54.5	78.0	66.3	-12.2
Tetrachloroethylene	1:20,000	Fumigant 24 hr. Immed.	82.0	62.0	46.7	30.0	55.2	+12.7	52.0	14.0	2.2	22.0	22.6	+71.0
Tetrachloroethylene	1:20,000	Fumigant 24 hr. 24 hr. delay	90.5	16.0	64.4	34.0	51.2	+19.0	92.3	70.0	40.0	82.0	71.1	+ 8.9
1,1,2 Trichloroethane	1:20,000	Fumigant 24 hr. Immed.	80.0	14.0	28.9	54.0	44.2	+30.1	54.0	49.0	22.0	40.0	41.3	+47.1
1,1,2 Trichloroethane	1:20,000	Fumigant 24 hr. 24 hr. delay	82.5	46.0	30.4	36.0	48.7	+22.9	95.0	94.0	47.7	66.0	75.7	+ 3.0
Sulfur	94%	Dust	67.4	46.0	13.3	2.2	32.2	+49.1	100.0	88.0	37.8	88.9	78.7	- 0.9
Dowicide A	0.5%	Spray	66.0	24.0	15.6	12.0	29.4	+53.5	30.0	16.0	11.1	24.0	20.3	+74.0
Orthocide 406	1.0%	Spray	36.0	30.0	11.1	6.0	20.8	+67.1	88.0	26.0	62.2	70.6	61.7	+20.9
Thiolutin	20 ppm	Spray	94.0	54.0	--	--	74.0	-11.8	100.0	90.0	--	--	95.0	+ 1.9
Thiolutin	100 ppm	Spray	--	--	68.9	64.0	66.5	-10.5	--	--	62.2	91.8	77.0	-30.3
Rimocidin	20 ppm	Spray	94.9	76.0	--	--	85.5	-29.2	100.0	88.0	--	--	94.0	+ 2.9
Rimocidin	100 ppm	Spray	--	--	24.4	28.0	26.2	+56.5	--	--	15.6	38.0	26.8	+54.7
2121	1000 ppm	Spray	90.0	62.0	80.0	48.0	70.0	-10.8	100.0	76.0	53.3	94.0	80.8	- 3.6

* Percentage reduction over check. Plus sign indicates reduction, minus sign increase.

Table 5. Effect of post-harvest fungicides on development of decay of peaches inoculated with spores of *Monilinia fructicola* or *Rhizopus nigricans* after 6 days at 75° F.
Experiment 13 (11 & 12)

Fungicidal treatment			Percentage infection with M. fructicola						Percentage infection with R. nigricans					
Material	Conc.	Method	A %	B %	C %	D %	Av. %	Red. %*	A %	B %	C %	D %	Av. %	Red. %*
None	--	--	65.3	85.6	77.0	62.4	72.6	--	93.2	58.1	34.0	91.0	69.1	--
Sulfur	94%	Dust	31.1	36.0	35.6	26.7	32.0	+55.4	100.0	77.3	20.0	86.0	70.8	- 2.5
Stafresh Wax	1-2 H_2O	Spray	20.0	61.2	55.1	58.0	48.6	+33.1	100.0	100.0	54.0	86.3	85.1	-23.2
sothan Q 15 in wax emulsion	0.5%	Spray	4.0	46.0	8.0	26.0	21.0	+71.1	100.0	84.4	40.0	100.0	81.1	-17.4
Isothan Q 15	0.5%	Spray	0	26.0	--	--	13.0	+82.8	100.0	95.6	--	--	97.8	-29.2
me Sulfur Wraps	2: 100	Wrapped	34.0	62.0	50.0	56.0	50.5	+30.4	100.0	91.1	43.8	86.0	80.2	-16.1
Imidazoline	0.1%	Spray	10.0	26.0	28.0	46.0	27.5	+62.1	100.0	95.6	66.0	96.0	89.4	-29.3
Nitrosopyrazole	0.1%	Spray	15.4	74.0	--	--	44.7	+40.8	--	--	--	--	--	--

* Percentage reduction over check. Plus sign indicates reduction, minus sign increase.